

REMARKS

By this Amendment, claims 1-43 and 54-73 have been canceled, claims 44-53 have been amended, and claims 74-90 have been added.

Amended claims 44-53 are directed to a test method using a probe card 10 configured as shown in Figures 5 and 5A, with a flexible membrane 18.

Added claims 74-76 are directed to a test method using a probe card configured as shown in Figure 7D, with a slidable mounting plate 80A.

Added claims 77-90 are directed to a test method using a probe card configured as shown in Figure 7B, with spring loaded electrical connectors 42 for applying a biasing force and test signals.

Also being submitted with this divisional application are copies of a Petition for Correction of Inventorship in parent application serial no. 08/797,719, along with accompanying documents, and a Decision granting the Petition. In addition, an Information Disclosure Statement is being submitted with this divisional application.

Favorable consideration and allowance of amended claims 44-53 and added claims 74-90 is respectfully requested. Should any issues arise that will advance this case to allowance, the Examiner is asked to contact the undersigned by telephone.

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Respectfully submitted:



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Marked Version Of Specification Showing Changes

On page 30, line 2, after "Application Serial No. 08/520,871" add, --now, U.S. Patent No. 5,607,818--.

Marked Version Of Claims Showing Changes

44. (amended) A method for testing a semiconductor wafer having a plurality of contact locations comprising:

providing a testing apparatus for handling the wafer [comprising a force applying mechanism] and a test circuitry for applying test signals to the wafer;

providing a substrate comprising a plurality of contact members comprising raised members with penetrating projections configured to [establish] make temporary electrical [communication with] connections with the contact locations; [on the wafer, said contact members comprising raised members with penetrating projections;]

bonding a membrane to the substrate and to the testing apparatus, [said] the membrane configured to provide an electrical path [to] between the contact members and the test circuitry and to [mount] suspend the substrate to the testing apparatus such that the substrate and the contact members can move for making the electrical connections;

biasing the substrate against the wafer to make the electrical connections; and

applying test signals through the membrane and the contact members to the contact locations. [on the wafer.]

45. (amended) The method [as claimed in] of claim 44 [and] wherein the [substrate includes] contact members [for contacting] make the electrical connections with each die on the wafer at a same time and the test signals are electronically switched to selected dice.

46. (amended) The method [as claimed in] of claim 44 wherein the membrane allows the substrate to freely move in a z-direction.

[and further comprising mounting a compressible member between the force applying mechanism and substrate.]

47. (amended) The method [as claimed in] of claim 44 [and] wherein the membrane comprises an electrically insulating tape [having] and a plurality of conductors on the tape.

[and microbumps for bonding to the substrate.]

48. (amended) A method for testing a semiconductor wafer having a plurality of bumped contact locations comprising:

providing a testing apparatus configured to handle the wafer [comprising a force applying mechanism] and a test circuitry configured to apply test signals to the wafer;

providing a substrate comprising [indentation] a plurality of contact members comprising conductive indentations configured to retain [bumped contact locations on the wafer and to establish] and make temporary electrical [communication] connections with the bumped contact locations;

bonding a membrane to the substrate and to the testing apparatus comprising a polymer tape and a plurality of conductors on the polymer tape [, said membrane] configured to provide [an] electrical paths between [to] the contact members and the test circuitry, [to mount] the membrane suspending the substrate [to] on the testing apparatus with a slack sufficient to permit movement of the substrate and the contact members in a z-direction for making the electrical connections;

biasing the substrate against the wafer to make the electrical connections; and

applying the test signals through the [membrane] conductors and the contact members to the contact locations. [on the wafer.]

49. (amended) The method [as claimed in] of claim 48 wherein the polymer tape comprises polyimide and the conductors comprise copper.

[and further comprising mounting a compressible member to a backside of the substrate for cushioning a pressure applied to the substrate by the force applying mechanism.]

50. (amended) The method [as claimed in] of claim 48 [and] wherein the substrate comprises silicon.

51. (amended) A method for testing a semiconductor wafer containing a plurality of semiconductor dice with a plurality of contact locations comprising:

providing a testing apparatus configured to handle the wafer and a testing circuitry configured to apply test signals to the wafer;

providing a probe card comprising a substrate, [with] a raised contact member on the substrate at least partially covered with a conductive layer, and a conductor on the substrate in electrical communication with [a conductor, said] the conductive layer, the raised contact member having a height on the substrate of from 10 μ m to 100 μ m, [and having] the raised contact member comprising a surface and a penetrating projection [formed thereon] on the surface with a height of from .1 μ m to 1 μ m [, said projection] configured to penetrate a contact location on the wafer to a limited penetration depth;

providing a membrane comprising a polymer tape and a conductor on the tape;

physically and electrically connecting the probe card to [a] the testing apparatus using [a] the membrane, with the probe card movable in a z-direction on the testing apparatus;

[having a second conductor bonded to the conductor on the substrate; and]

placing the probe card on the wafer to make a temporary electrical connection between the contact location and the contact member with the probe card moving in the z-direction; and

applying the test signals through the [second] conductor [, through the conductor, and through the contact member to] and the contact member to the contact locations.

52. (amended) The method [as claimed in] of claim 51 [and] further comprising mounting a compressible member to the probe card for cushioning contact forces. [between the force applying mechanism and substrate.]

53. (amended) The method [as claimed in] of claim [51] 52 [and] further comprising applying pressure from the testing apparatus [through] to the probe card using a pressure plate in contact with the compressible member.

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February 5, 2002
Date of Signature

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